Any function having the property $f(-x) = f(x)$ is called an **even function.** Any function having the property $f(-x) = -f(x)$ is called an **odd function.** These names apply even if the equation for the function does not have exponents.

DEFINITION: Even Function and Odd Function

The function f is an **even function** if and only if $f(-x) = f(x)$ for all x in the domain.

The function f is an **odd function** if and only if $f(-x) = -f(x)$ for all x in the domain.

Note: For odd functions, reflection across the y-axis gives the same image as reflection across the x-axis. For even functions, reflection across the y-axis is the same as the pre-image. So odd functions are symmetric about the origin, and even functions are symmetric across the y-axis. Most functions do not possess the property of oddness or evenness.

Problem Set 1-6

Reading Analysis

From what you have read in this section, what do you consider to be the main idea? Reread the paragraph on page 48 that discusses Figure 1-6d. Use numerical values from the graph to guide yourself through this paragraph. Explain in your own words what the sentence about negative values of x means. Why is part of the graph of f "lost" in the graph of $f(|x|)$? Write down specific questions about what you may not understand, and find someone who can answer them.

Quick Review

Q1. If $f(x) = 2x$, then $f^{-1}(x) =$ __?__.

Q2. If $f(x) = x - 3$, then $f^{-1}(x) =$ __?__.

Q3. If $f(x) = 2x - 3$, then $f^{-1}(x) =$ __?__.

Q4. If $f(x) = x^2$, write the equation for the inverse relation.

Q5. Explain why the inverse relation in Problem Q4 is not a function.

Q6. If $f(x) = 2^x$, then $f^{-1}(8) =$ __?__.

Q7. If the inverse relation for function f is also a function, then f is called __?__.

Q8. Write the definition of a one-to-one function.

Q9. Give a number x for which $|x| = x$.

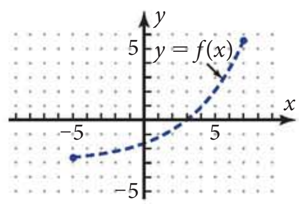
Q10. Give a number x for which $|x| = -x$.

For Problems 1–4, sketch the graphs of

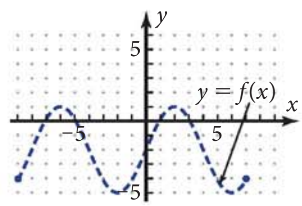
a. $g(x) = -f(x)$ **b.** $h(x) = f(-x)$

c. $a(x) = |f(x)|$ **d.** $v(x) = f(|x|)$

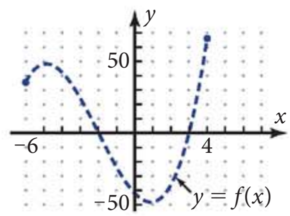
1.



2.



3.



4.